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ABSTRACT

Career education concepts are all closely linked to the occupational cluster, which has become the basic element in career education curriculum development and programing. Procedures for preparing a cluster-based occupational curriculum are presented, including the collection of manpower data and occupational selection. Other components of the model include: (1) describing selected occupations and clustering these occupations by commonality of job tasks, (2) analyzing the instructional components of each instructional task to provide the teacher with a "task module" for teaching each identified skill, (3) skill transferability, which is demonstrated by cluster commonality analysis with career ladder sequencing of tasks, (4) pre-assessment of students, (5) individualized instruction, and (6) multimedia instructional materials. (MF)

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A DESCRIPTIVE OVERVIEW OF THE CLUSTER-BASED OCCUPATIONAL CURRICULUM DEVELOPMENT MODEL

(CBOCDM)

Prepared by:

L. Allen Phelps
Vocational Education Consultant
Vocational Education/Special Education Project
Central Michigan University

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PREFACE

The need for a new and relevant career preparation curriculum design to suit the objectives of career education fostered the preparation of this narrative. This exemplary curriculum model was developed from an accumulation and synthesis of several systematic models and programs.

The model was initially conceived and operationalized through a curriculum development research project at Central Michigan University. The model was originally designed by the author as a vehicle for developing occupational preparation programs for handicapped persons. With a few variations the model was altered to serve a "total" population. The successful implementation and utilization of the original model led to the expanded revisions and preparation of this narrative.

Illustrated figures of each of the developmental phases of the model, as well as the model itself, are contained in the text.

A DESCRIPTIVE OVERVIEW OF THE CLUSTER-BASED OCCUPATIONAL CURRICULUM DEVELOPMENT MODEL (CBOCDM)

The emerging theme of career education brings with it a new, interesting, and challenging role for instructional supervisors and developers, as well as for teachers concerned with curriculum development. This challenging role encompasses the task of designing, developing, and operationalizing an educational program which has essentially one objective - the preparation of all students for successful careers in the world of work.

Since the initiation of the "career education" movement, numerous authors have defined, analyzed, discussed, and enumerated the various goals, concepts, and components of this new animal. From the literature, a baseline description of career education encompasses such concepts as: career awareness, career exploration, career development, multi-faceted community involvement, home and family education, interdisciplinary subject matter, "hands-on" experiences, diversified learning environments, and numerous other generaic yet focal elements.

Each of these concepts or components seems to be closely linked to a basic element - the occupational cluster. It now appears that the cluster concept will become the major "vehicle" for career education curriculum development and programming.

THE CLUSTER CONCEPT: A CAREER EDUCATION VEHICLE

By definition a cluster is a homogeneous grouping of similar or related elements. Several different types of clusters have been identified and analyzed to date by researchers. These include clusters of occupations, industries, job content, physical job characteristics, psychological job characteristics and numerous others.

The U.S. Office of Education has recently provided some significant leadership with their organization and presentation of the fifteen (15) occupational clusters. This industry-based clustering scheme conceivably encompasses all of the occupations presently existing within our society. For informational purposes the fifteen occupational clusters prescribed by USOE include: health, business and office, agriculture/natural resources, fine arts and humanities, communications and media, construction, distribution and marketing, marine science, hospitality and recreation, manufacturing, consumer and homemaking, personal service, public service, transportation, and environmental control.

Broad-based clustering schemes such as this one lend themselves almost exclusively to the objectives of career orientation and career exploration. Career orientation and exploration, by design, are the predominant concern of elementary and junior high career education programs. To date, however, little direction has evolved for utilizing the cluster concept as a vehicle for curriculum development at the career preparation or skill training level.

At the career preparation level a variety of cluster analysis schemes may be undertaken. Each approach will probably depend upon the specific needs, objectives, and goals as dictated by the local

educational setting, or as determined by the local educational agency.

The writings of Hoyt, Evans and others (1972) addressing themselves to this topic have identified at least five essential components for program design at the career preparation level. These five essential components include: (1) skill transferability, (2) performance-monitored instruction and evaluation, (3) open program entry and exit, (4) pre-assessment of mastered skills, and (5) modes of individualized instruction.

SKILL TRANSFERABILITY

With today's rapidly expanding and changing technology the essence of job content is changing in many instances, also. In the immediate future increased emphasis has to be given to developing cluster-based programs, which will assure that skills obtained in such programs will be transferable to and from more than one occupation or job within that cluster.

PERFORMANCE-MONITORED INSTRUCTION AND EVALUATION

Performance-monitored instruction and evaluation suggests structuring, implementing, and evaluating a set of observable behavioral objectives for instruction. The specific objectives identify quite succinctly what the employer expects an entry-level applicant to be able to do. This set of objectives should include a specification of the conditions under which the behavior is to be performed, the behavior itself, and the criterion for successful performance. Student credit is then based upon the successful attainment of terminal behavioral objectives identified for the course or terminal program, irregardless of the time

required to meet those terminal objectives.

OPEN PROGRAM ENTRY AND EXIT

The career ladder concept is not entirely new to occupational education, but it is an essential part of the emerging career education philosophy. The concept purports that an open-entry program should develop the abilities and skills of the learner in a sequential ladder of difficulty and/or job performance. Open points of exit must exist on the ladder in order that the learner may terminate the educational program at any time and for any reason, and enter the labor market with an employable skill. The career ladder concept also lends itself efficiently to program re-entry and skill development for purposes of advancement and/or re-training.

PRE-ASSESSMENT OF MASTERED SKILLS

Supplementary and total education is the basic foundation of career education as we presently define it. The identification and assessment of previous education attainment, irregardless of its source — the community, the home or family, previous experience, etc. — is of key importance. Seemingly, if the instructional process is to be efficient and accountable, it must acknowledge these previously-mastered skills. The essence of career preparation instruction should be the expansion of the individual learner's accumulated knowledge and skill.

INDIVIDUALIZED INSTRUCTION

The most essential of these program elements is a regard for the individual student's learning pattern or style. All people do not

learn effectively by the same processes, or even through the same senses — just as all medical patients are not cured by the same treatment or the same pill.

The mode of instruction must be individualized to meet the prescriptive needs of each student, whether he be handicapped, gifted, disadvantaged, slow, "normal", or descriptively categorized by any other label.

HOW?

The logical question which follows is: "How do we systematically incorporate these concepts into a curriculum design?" This basic question can be answered to a great extent by the following discussion/presentation of the Cluster-Based Occupational Curriculum Development Model.

THE CLUSTER-BASED OCCUPATIONAL CURRICULUM DEVELOPMENT MODEL: A CAREER EDUCATION DESIGN

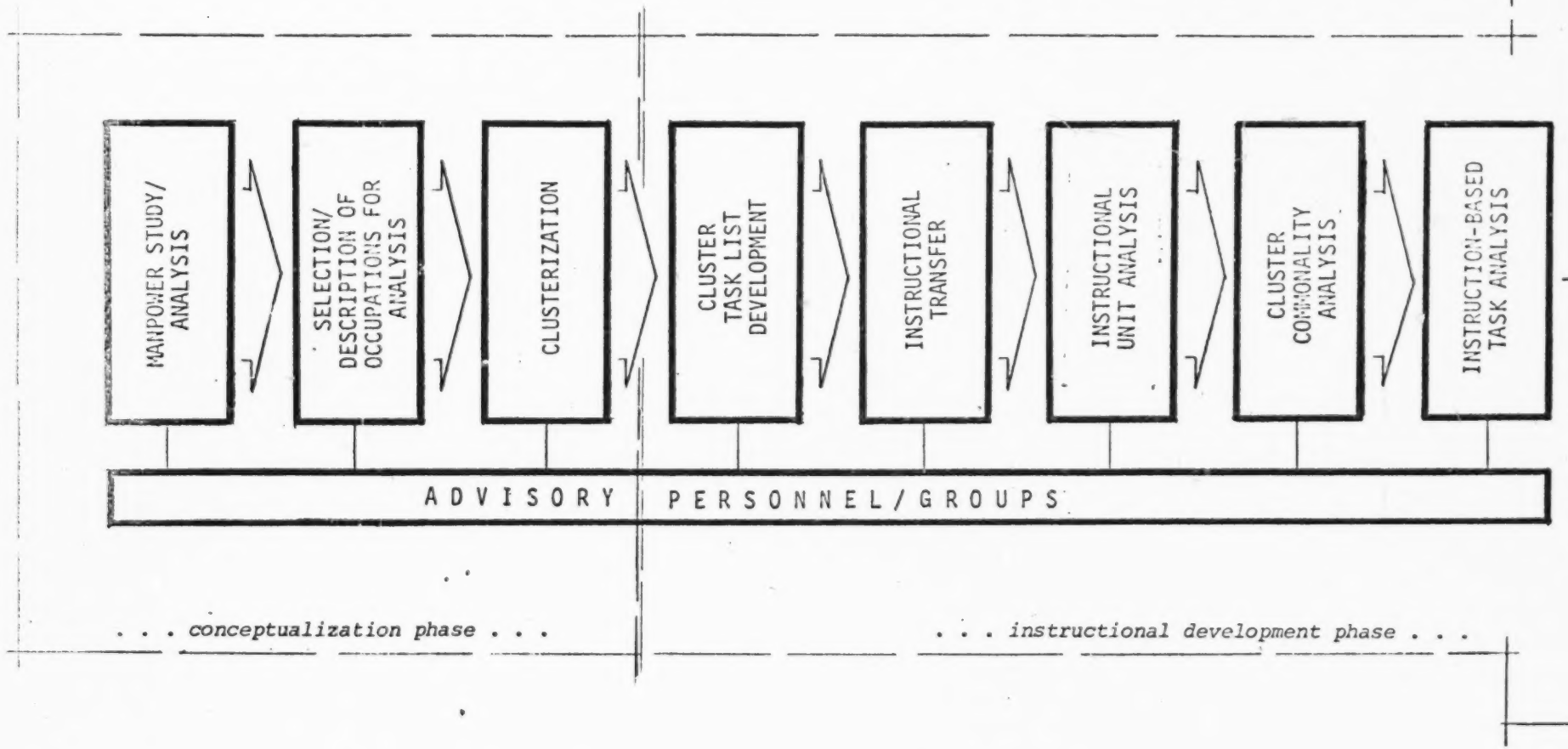
The model illustrated in Figure 1 identifies a procedure or process for preparing a flexible cluster-based occupational curriculum.

Designed primarily for implementation in a skill development program, the model is intended for use by instructional developers and teachers. By following a logical analysis procedure, an instruction-based task module can be readily conceptualized. This instruction-based task module provides a teacher with the essential elements for instruction; namely, performance-stated task skills and task knowledges, sequentially-designed instructional strategies, and supplementive instructional materials.

A discussion of a practical application of the model will serve to provide the reader with a complete understanding of the applicability

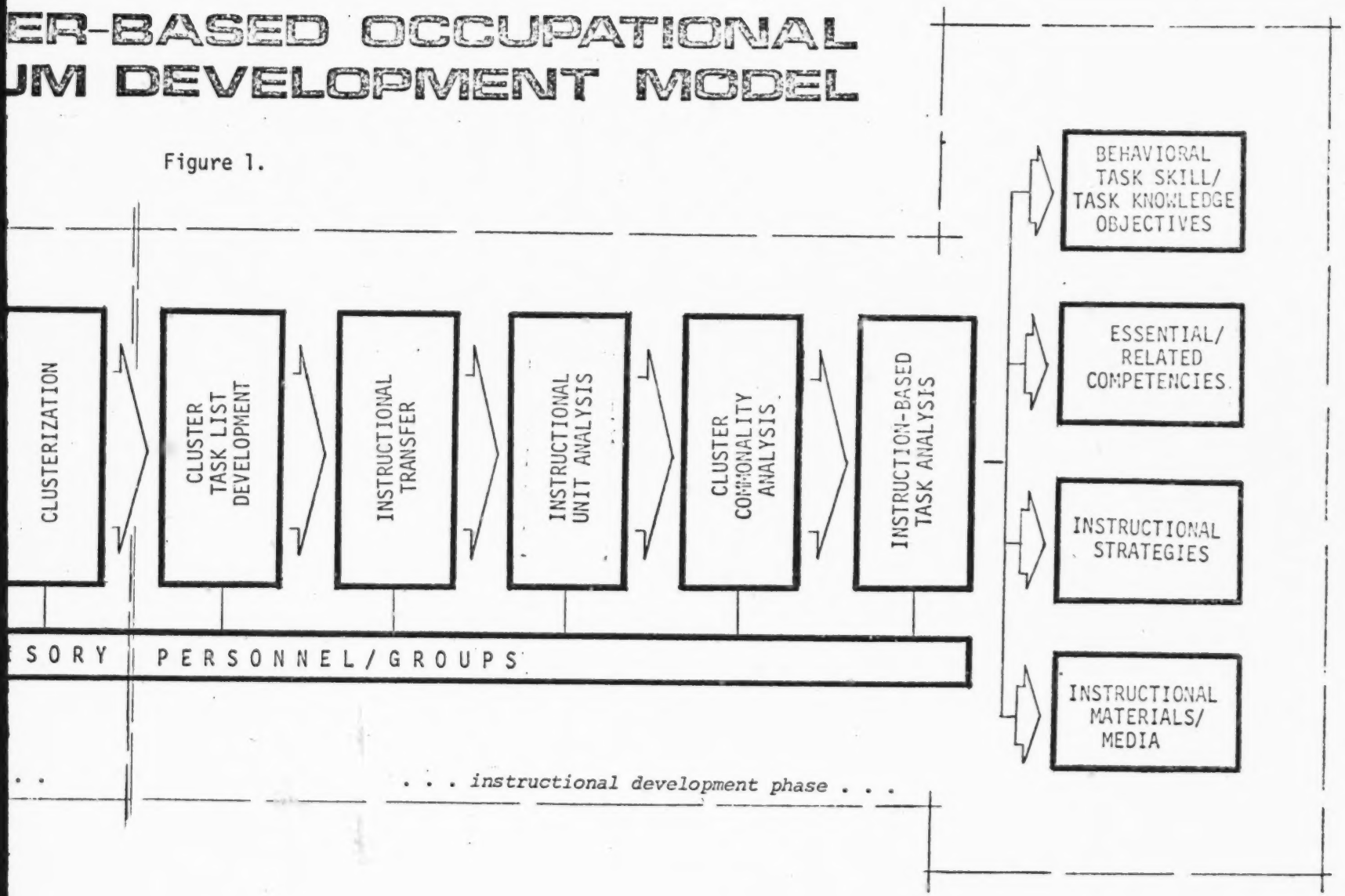
THE CLUSTER-BASED OCCUPATIONAL CURRICULUM DEVELOPMENT MODEL

Figure 1.


MANPOWER STUDY/ ANALYSIS
SELECTION/ DESCRIPTION OF OCCUPATIONS FOR ANALYSIS
CLUSTERIZATION
CLUSTER TASK LIST DEVELOPMENT
INSTRUCTIONAL TRANSFER
INSTRUCTIONAL UNIT ANALYSIS
CLUSTER COMMONALITY ANALYSIS
INSTRUCTION-BASED TASK ANALYSIS
ADVISORY PERSONNEL/GROUPS
. . . conceptualization phase . . .
. . . instructional development phase . . .

ER-BASED OCCUPATIONAL
UM DEVELOPMENT MODEL

Figure 1.



and adaptability of this innovative curriculum development scheme.

.It is important to note before beginning that an important assumption underlies the successful implementation of this curriculum or program development model. It is assumed that: *the community and/or school administration's major concern is the development or maintenance of a relevant and comprehensive program of occupational career preparation designed to meet the needs of both the individuals and the society being served.* Needless to say, the financial support of the community and administration is the essential prerequisite to development, implementation, or operation of any program and its curriculum.

MANPOWER STUDY AND ANALYSIS

As stated earlier, the basic objective of career education is to prepare students for successful careers. In local programs this often means preparing students for employment in either a specific geographical region or a specific industry (Industry may be equated with "cluster" to some extent as alluded to earlier). This, of course, necessitates determining the nature of employment opportunities within that region or industry.

A specific manpower analysis by industry is used most effectively in career preparation programs at the post-secondary or technical education level. The geographical area analysis, on the other hand, is commonly utilized in secondary programs where an effort is being made to fulfill the needs and interests of a more diversified population. In certain instances, however, post secondary programs are finding an increasing need for combining both approaches to avoid preparing qualified, but locally unmarketable graduates.

MANPOWER DATA SUMMARY

Figure 2

Occupational Title	D.O.T. No.	Present State or Regional Employment	Data Source	Projected (1980) State or Regional Employment	Data Source	National Employment Level	Data Source	1972-73 Employment Outlook Handbook Projection	Projected Additional Manpower Needed By 1980
Automobile Mechanic	620.281	8240	2/	9610	2/	600,000	1/	moderate increase	1370
Automobile-Body Repairman	807.381	2150	2/	2460	2/	100,000	1/	moderate increase	310
Automobile Service Station Attendant	915.867	6950	2/	7230	2/	410,000	1/	moderate increase	280
Diesel Mechanic	625.281	860	3/	1120	3/	85,000	1/	very rapid increase	260
Gasoline Engine Repairman	625.281	260	2/	480	2/	6,800	1/	rapid increase	220
Motorcycle Repairman	620.281	300	2/	510	2/	6,500	1/	rapid growth	210
Automobile Painter	845.781	560	3/	620	3/	30,000	1/	moderate increase	60

1/ 1972-73 Employment Outlook Handbook
2/ State Chamber of Commerce
3/ State Department of Labor

The essential data in conducting a manpower study and analysis may be collected from a variety of sources. The Employment Outlook Handbook, which is published annually by the U.S. Department of Labor, provides an assessment of national employment trends. It also provides a composite description of specific job duties and responsibilities, the respective wages or salary, and the projected employment outlook for the foreseeable future for specific occupations.

In addition, State labor departments often compile manpower data on a regular basis. Federal, state, and local employment agencies are usually in close touch with employment trends and projections also. Another source of accurate employment data is the regional or area Chamber of Commerce.

Any or all of these sources can potentially provide some relevant numerical data concerning the employment needs and projections of a given geographical region or industry.

The primary objective of occupational education is to provide the manpower required to produce economic goods and services for a highly specialized society. This task cannot be undertaken without first looking closely at the diversified manpower needs of that society.

SELECTION/DESCRIPTION OF OCCUPATIONS

The selection/description section of the model involves the selection and detailed description of the occupations to be analyzed.

The selection phase is basically an analysis or interpretation of the data collected from the preceding manpower study. Justification for the selection of an occupation for analysis is based upon two sets of data. The specific data of primary importance are: (1) the absolute

number of replacement manpower needed in the projected future, and (2) the absolute number of "explosion" or "growth" manpower needed in the projected future.

Absolute data as opposed to relative data, are more readily and accurately interpreted for purposes of program justification.

The description of the selected occupations follows as the next step in the development process. Job descriptions can be prepared for a variety of purposes, but the major purpose as it pertains to the model is - the preparation of job descriptions as a basis for deriving curriculum and instructional content. This content is arrived at through task analysis of the job descriptions prepared at this point in the development.

The three components which make up a comprehensive job description are: (1) a general duty description, (2) a common place(s) of employment description, and (3) a detailed list of the job tasks which are performed.

Data for preparing the job descriptions may be obtained by interviewing the person performing the actual job, by observing his performance and detailing the job activities, or by utilizing management-prepared job descriptions.

Some optional guidance - related information may also be tabulated as the job descriptions are being prepared. Such information as physical competencies, salary/wage information and working conditions are readily accessible when job descriptions are written. This career development information is extremely helpful in preparing instructional modules related to career opportunities.

Figure 3 on page 11 illustrates a typical job description.

SAMPLE JOB DESCRIPTION

Figure 3

OCCUPATION: Motorcycle Repairman

General Duty Description: The motorcycle mechanic's general duties involve diagnosing and servicing mechanical and electrical malfunctions occurring with various types and models of motorcycles and motor scooters

Places of Employment: Nearly all of the people employed as motorcycle mechanics work for motorcycle dealers. Others are employed by municipal governments for servicing police motorcycles, and a few are employed in motorcycle customizing shops.

Job Tasks:

1. Measures generator output, ignition timing, and other engine performance indicators
2. Dismantles engine
3. Repairs or replaces defective parts, such as carburetors, magnetos, etc.
4. Removes cylinder heads
5. Grinds valves
6. Replaces defective valves, pistons, cylinders, and rings
7. Hammers out dents and bends in frame
8. Welds tears and breaks
9. Reassemble and installs engine
10. Repairs and adjusts clutches, brakes, and drive chains

. . .
. . .
. . .

CLUSTERIZATION

At this point we begin to implement one of the essential program elements described earlier by clustering or grouping the previously identified occupations. The cluster is a group of related occupations in which the skills performed are to some degree similar and transferable.

To be more specific, each of the occupations placed in a given cluster must require the performance of job tasks common to at least one other occupation within that cluster.

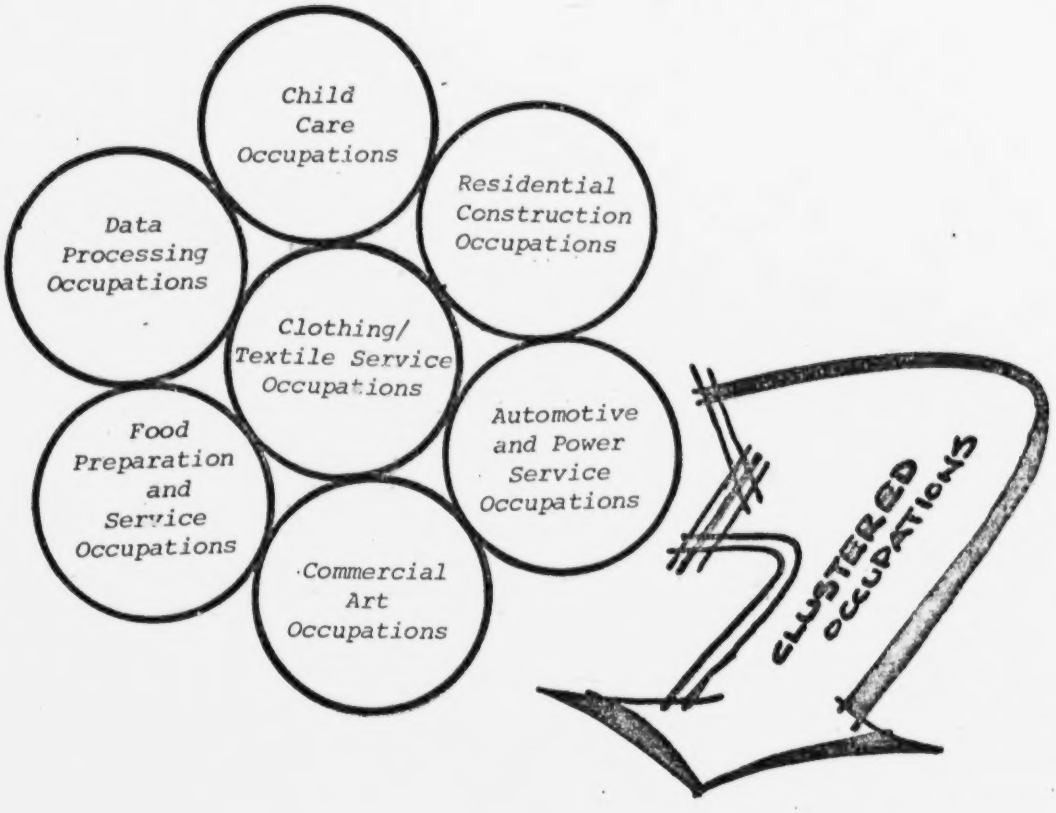
Perhaps an example might serve to clarify the process of clusterization. The occupations of Gasoline-Engine Repairman, Diesel-Mechanic, and Auto-Mechanic all require the performance of a series of common job tasks such as: (1) using hand and powered mechanic's tools, (2) inspecting and measuring parts, (3) servicing fuel systems, (4) servicing ignition systems, etc. If the specific job tasks to be performed in these occupations are common to at least one other occupation within the cluster then the proposed clustering scheme would be legitimate.

Specific justification for the clustering scheme may be amended somewhat to include "desired" job tasks. In other words, if the identified job task was considered an "essential" job behavior for one occupation, but a "desirable" job behavior for another occupation within the cluster, the resultant clustering scheme could also be considered legitimate. The essential element for clustering is an "identifiable" degree of commonality between the job tasks performed by each of the occupations within the cluster.

This clustering phase of the curriculum development process is extremely critical because it is often dependent upon two other program

TYPICAL OCCUPATIONAL PREPARATION
PROGRAM CLUSTERS

Figure 4



Diesel Mechanic

Automobile Painter

Automobile Mechanic

Motorcycle Repairman

Automobile-Body Repairman

Gasoline Engine Repairman

Automobile Service Station Attendant

components — facility and instructional personnel. Ideally the facility should be prepared and the instructional personnel hired after the clustering phase has been completed. In many instances, however, the facility is already present, so the curriculum is adapted or designed in light of the facility or the strengths of the teachers. If this is the case, adjustments and careful considerations have to be made in the identification of clusters.

CLUSTER TASK LIST DEVELOPMENT

This step in the total development process initiates the instructional development phase. The emphasis now shifts from analyzing the world of work and selected occupations to the specific development of instruction or curriculum.

This stage of development involves the compilation of a singular list of all job tasks performed within the cluster. A singular list for the cluster will eliminate the duplication or overlap of certain job tasks. It will also provide a basis for the following sequence of instructional development procedures.

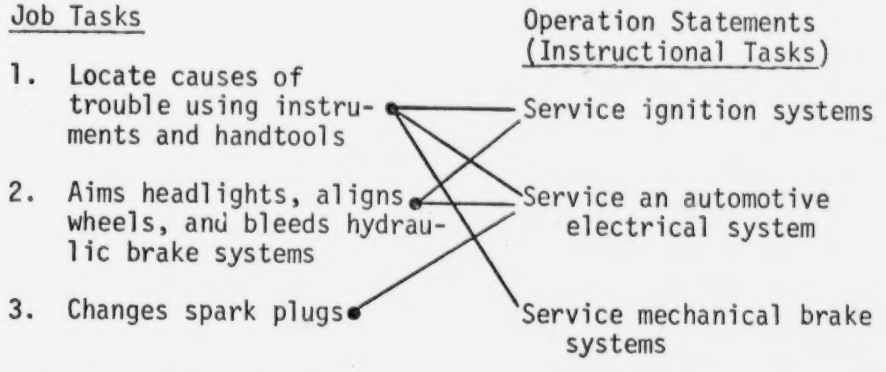
INSTRUCTIONAL TRANSFER

Instructional development is further expanded by converting the previously identified job tasks into an educational context. This step is necessary because job tasks and job descriptions are usually written for the single purpose of describing an occupation. If these job tasks are to become the basis of instruction they must be converted to suit the educator's frame of reference. This transference will assist to efficiently organize the instruction for the teacher.

The following are typical job task statements taken from the D.O.T. (Dictionary of Occupational Titles):

1. locates cause of trouble using instruments and handtools
2. aims headlights, aligns wheels, and bleeds hydraulic brake system
3. changes spark plugs

Quite apparently these statements range from broad to specific in terms of the number and types of skills involved. In order to transfer these statements to a relevant context for instruction an intermediate level of specificity must be identified. In most instances this intermediate level of specificity can be thought of as an "operation". The concept or level of "operation" would break down certain job tasks and combine others to arrive at a somewhat consistent level of specificity. The following example illustrates the idea.


Job Tasks
1. Locate causes of trouble using instruments and handtools
2. Aims headlights, aligns wheels, and bleeds hydraulic brake systems
3. Changes spark plugs
Operation Statements (Instructional Tasks)
Service ignition systems
Service an automotive electrical system
Service mechanical brake systems

This partial list of job tasks for an auto mechanic illustrates the transferance concept. Since the operation statements are simply job tasks reorganized for purposes of instruction, they will be referred to from now on an "instructional tasks".

INSTRUCTIONAL UNIT ANALYSIS

Immediately following the transference phase is the instructional unit analysis. Here the major objective is to categorize and arrange the related instructional task statements into instructional units.

Identification of the instructional units within the cluster provides an effective organizational tool for sequencing instruction. The utility of the instructional unit analysis for sequencing will become clearer following a discussion of next phase.

Instructional units also provide for an identification of certain generic cluster-content concepts. These generic concept labels are extremely helpful in organizing the instructional content for an occupational preparation program.

Figure 5 provides an illustration of instructional unit analysis concept.

CLUSTER COMMONALITY ANALYSIS

The next development activity is to verify the transferability or commonality of the identified instructional tasks. The major justification for the cluster-based analysis is the concept of skill transferability. Skills (instructional tasks) learned within a cluster-based curriculum must, to some degree, be transferable to at least two identified occupations within that cluster. To put it simply the identified instructional tasks must be required skills for at least two occupations within the cluster design.

Cluster commonality analysis also lends itself to the development of a career ladder for the cluster. Those basic instructional tasks

INSTRUCTIONAL UNIT ANALYSIS

Figure 5

C L U S T E R: Automotive and Power Service Occupations

Instructional Units / Selected Entry Occupations	Auto-Body Repairman	Auto Painter	Auto-Mechanic	Diesel Mechanic	Motorcycle Repairman	Gasoline Engine Repairman	Service Station Attendant
1.00 Mechanical Maintenance	X	X	X	X	X	X	X
2.00 Small Engine Service					X	X	
3.00 Engine Systems Service			X	X	O	O	O
4.00 Service Station Maintenance	X	O	X	X	O	O	X
5.00 Vehicle Body Maintenance	X	X					

x - indicates a required competency level

o - indicates a related competency level

CLUSTER COMMONALITY ANALYSIS

Figure 6

CLUSTER: Automotive and Power Service Occupations

Instructional Tasks	Selected Entry Occupations: Auto-Body Repairman	Auto Painter	Auto Mechanic	Diesel-Mechanic	Motorcycle Repairman	Gasoline Engine Repairman	Service Station Attendant
4.00 SERVICE STATION MAINTENANCE							
4.01 Servicing storage batteries	X		X		X		X
4.02 Performing light engine tune-up			X		X	X	X
4.03 Balancing tires			X		0		X
4.04 Aligning front ends	X		X				X
4.05 Installing auto accessory replacement parts	X		X				X
4.06 Performing vehicle service checks	X		X				X
4.07 Replacing and servicing exhaust systems			X		0		X
4.08 Cleaning and waxing vehicles		0			0		X
4.09 Lubricating chassis			X				X
4.10 Repairing and mounting tires					0		X
4.11 Operating fuel pumps and completing sales transactions					0		X

x - essential skill *o - desirable skill*

which are common to all of the occupations within the cluster form the first rung of the cluster career ladder. As succeeding instructional tasks become sequentially more difficult the career ladder is identified. This rank ordering of instructional tasks also outlines a general sequence of instruction, leading from simple to complex.

The basic scheme for doing this analysis was extensively utilized in the development of the Oregon Way Career Cluster Program (1968). Graphically, the cluster commonality analysis is a two dimensional matrix which identifies the commonality relationship of each instructional task to each of the clustered occupations.

INSTRUCTION-BASED TASK ANALYSIS

Following a cluster commonality verification of each of the tasks, a task analysis is undertaken. This process is referred to as an "instructional-based task analysis" since the primary objective is to analyze the instructional components of a given instructional task.

The four components for the instruction-based task analysis are: (1) behavioral task skill/task knowledge objectives, (2) essential/related competencies, (3) instructional strategies, and (4) instructional materials/media. An analysis of these four components for a given instructional task provides the teacher with a "task module". The task module is basically the resource (or lesson plan) for teaching identified skill.

The following discussion will describe, in depth, the implementation, utilization, and flexibility of the total task module through a review of each of the components.

OCCUPATIONAL PROGRAM CLUSTER: AUTOMOTIVE AND POWER SERVICE OCCUPATIONS

INSTRUCTIONAL UNIT: Service Station Maintenance

INSTRUCTIONAL TASK: Servicing storage batteries

BEHAVIORAL TASK KNOWLEDGES/ TASK SKILLS	ESSENTIAL/RELATED COMPETENCIES	INSTRUCTIONAL STRATEGIES
Given the necessary tools, materials, equipment, and requisite knowledge, the learner will 1. identify and describe the function of each of the component parts of a battery with 80% accuracy. 2. identify and describe the applications or uses of different types of batteries with 80% accuracy. 3. locate and determine battery specifications in a parts manual with 100% accuracy. 4. recognize and observe specific safety precautions relating to servicing batteries with 100% accuracy. 5. perform the following job skills with accuracy to meet the accepted manufacturer's specifications: a. check electrolyte level of battery cells and adjust to proper level b. activate a new dry charged battery c. charge a battery according to specifications d. check specific gravity of electrolyte and temperature compensate the reading with hydrometer	B1 - Battery part names B31 - Battery servicing manual C12 - Battery voltage D2 - Battery schematic F1 - Battery servicing tools G2 - Battery construction materials - Electrolyte composition	INTRODUCTION • Class discussion of the battery's function in relation to the system. • Students view film "The Story of the Modern Storage Battery" battery functions and operation. PRESENTATION • Individualized or small group demonstrations of the following charts and overhead transparencies: capacity test, leakage and high rate discharge test. • Students view film "Battery Service" for presentation of specific operations. • Service Station Attendant presents class demonstration of how dry battery. • Student-directed demonstration of procedures for completing vi PRACTICE • Students perform selected tests individually on several number and record test data on a prepared answer sheet. • Students are encouraged to bring in, check, and service differ of storage batteries, i.e. motorcycle batteries. EVALUATION • Oral quiz given individually to students covering identificati functions, using cutaway mockup of a storage battery. • Written quiz or exam. • Battery troubleshooting/testing quiz, using malfunctioning or batteries.

SAMPLE FIGURE 4

INSTRUCTIONAL MATERIALS / ME	
TITLE	MEDIA T
Test batteries 12 volt 6 volt "Battery Service" Battery Capacity (Load) Test "Battery Service"	Real obj Film, le Transpar Film, 8m

. . . additional materials/media to be listed.

TIVE AND POWER SERVICE OCCUPATIONS

Maintenance

ing storage batteries

MODULE SEQUENCE NO.

APS - 4.01

SSENTIAL/RELATED COMPETENCIES	INSTRUCTIONAL STRATEGIES
- Battery part names - Battery servicing manual - Battery voltage Battery schemati Battery servicing tool Battery construction materials Electrolyte composition	INTRODUCTION • Class discussion of the battery's function in relation to the automotive electrical system. • Students view film "The Story of the Modern Storage Battery" as an introduction to battery functions and operation. PRESENTATION • Individualized or small group demonstrations of the following tests, using Delco-Remy charts and overhead transparencies: capacity test, leakage test, light load test, and high rate discharge test. • Students view film "Battery Service" for presentation of specific battery servicing operations. • Service Station Attendant presents class demonstration of how to activate and test a dry battery. • Student-directed demonstration of procedures for completing visual battery checks. PRACTICE • Students perform selected tests individually on several numbered batteries in the lab and record test data on a prepared answer sheet. • Students are encouraged to bring in, check, and service different types and capacities of storage batteries, i.e. motorcycle batteries. EVALUATION • Oral quiz given individually to students covering identification of battery parts and functions, using cutaway mockup of a storage battery. • Written quiz or exam. • Battery troubleshooting/testing quiz, using malfunctioning or non-functioning batteries.

FIGURE

INSTRUCTIONAL MATERIALS/MEDIA

TITLE	MEDIA TYPE	MGT. MODE	PROC. INFO.
Test batteries 12 volt 6 volt	Real objects	TEACH, PARA, GROUP, SELF, PEER	
"Battery Service"	Film, 16mm	PARA	PAYBAR
Battery Capacity (Load) Test	Transparency	TEACH	BX
"Battery Service"	Film, 8mm	SELF	MEA

. . . additional materials/media to be listed. . .

Behavioral Task Skills/Task Knowledges: The first component of the task module as illustrated in Figure 7 is the behavioral objectives identifying the related task skills and task knowledges. Simply stated, this component is designed to identify what the student must know and do in order to perform the instructional task successfully.

Behavioral or performance objectives have recently become a popular mode of organizing instruction. Mager's approach (1962) to organizing and preparing instructional objectives seems to be the most popular to date. He suggests there should be three components to a performance-based objective - the conditions or givers, the behavior or performance itself, and the criterion of successful performance. If these three elements are identified in a singular statement, one should logically be able to concretely evaluate a student's ability to perform a given task and comprehend the related cognitive concepts.

Employer-validated behavioral objectives also tend to squelch the ancient discontent between industry and education. If systematically prepared objectives are indeed utilized, and students are behaviorally evaluated, there is no basis for conflicting contentions. Behaviors tend to be a handle which people from industry and people from education can both readily grasp.

Essential/Related Competencies: This element of the task analysis can be considered fundamental, as well as to some degree innovative in the curriculum design. The essential and related competencies are defined as the prerequisite and related competencies which are both

fundamental and supplemental to the performance of the instructional task.

A further definition of the essential occupational competencies would describe them as basic skills, applicable to a given occupational area. The essential competencies are identified in three distinct areas: employment skills, vocabulary and language, and mathematics/measurement. Several basic skill concepts were identified for each of these three areas and are listed in Figure 8.

The related occupational competencies are identified in four distinct areas: graphic communication, fastening processes, tool operations and materials analysis. Again, several related skill concepts were identified within each of the four areas.

The related occupational competencies are designed to provide for the horizontal articulation of instruction. In other words, the concepts identified as related occupational competencies may be taught by a related occupational teacher in a "correlated instructional format." The "cooperative" instruction serves to reinforce and supplement the learner's experiences in a specific occupational program. A focused, comprehensive learning experience, with inputs from each of the functionally-related educational disciplines, provides for the occupational preparation of a "total" individual.

For each instructional task module the appropriate essential/related competencies are indicated by a code. The interpretive key to the code is illustrated in Figure 8.

Following certain coded competencies is a word or phrase. This word or phrase is intended to focus the competency to a specific area.

CLASSIFICATION OF ESSENTIAL/RELATED OCCUPATIONAL COMPETENCIES

Figure 8

CODE	ESSENTIAL OCCUPATIONAL COMPETENCIES
A	Employment Skills
A1	Related Career Exploration
A2	Employment Seeking Procedures
A3	Interview Procedures
A4	Social Service Agency Functions
A5	Human Relations
A6	Socialization/Communication Skills
B	Vocabulary and Language
B1	Related Technical Vocabulary
B2	Related Technical Language
B3	Interpretation of Manuals
B31	Service Manuals
B32	Procedure Manuals
B33	Operation Manuals
B4	Catalog Utilization/Interpretation
B5	Interpretation/Utilization of Business Forms, Bills, Work Orders, etc.
C	Mathematical/Measurement
C1	Addition
C2	Subtraction
C3	Multiplication
C4	Division
C5	Decimal Operations
C6	Metric System
C7	Vernier Measurement
C8	Printer's Measurement System
C9	Distance Measurement
C10	Weight Measurement
C11	Torque Measurement
C12	Electrical Measurement
C13	Pressure Measurement
C14	Time Measurement
C15	Angularity Measurement
C16	Temperature Measurement

CODE	RELATED OCCUPATIONAL COMPETENCIES
D	Graphic Communication
D1	Shape Description/Sketching
D2	Blueprint Reading
D3	Idea Visualization
D4	Charts/Graphs
D5	Graphic Display
D6	Design Principles
D7	Layout Design
D8	Lettering
D9	Symbolization
D10	Product Design
E	Fastening Processes
E1	Welding Processes
E2	Mechanical Processes
E3	Cohension Processes
E4	Adhesion Processes
F	Tool Operations
F1	Tool Selection
F2	Tool Utilization/Application
F3	Tool Maintenance
G	Materials Analysis
G1	Material Identification
G2	Material Composition/Characteristics
G3	New Materials

This bridge is needed in order to more accurately identify the essential/related competencies for a given task. The essential and related competencies assist, to some degree, in individualizing instruction for the learner. The identified essential competencies provide a basic checklist of competencies needed for direct success in the program. Say, for instance, a particular student is involved in the instructional task of "handling credit card transactions." An essential mathematical competency for that task is addition of numbers. The individualized remedial or special instruction needed for obtaining successful performance in this competency could efficiently and effectively be handled by a remedial or special education teacher.

The related occupational competencies also assist in individualizing and synthesizing instruction. Most occupational preparation programs presently do not effectively consolidate related instructional concepts. A typical example of this related potential for instruction is illustrated by the instructional task of "servicing automotive exhaust systems." This task requires the development of the skill of flame cutting, which can be efficiently and effectively taught by a welding instructor. Utilization of the welding instructor for teaching this related skill will provide the learner with an extensive understanding of the complete flame cutting process. This intensive and comprehensive supplement to his specific area of occupational instruction better prepares the learner for job entry.

Instructional Strategies: The third element of the task analysis involves instructional methodology. The critical question to be answered is: "What are the most effective techniques for teaching this particular

instructional task?"

The total instructional strategy is divided into four sequential segments. The four segments of the strategy include: introduction, presentation, practice, and evaluation. Nearly all occupational preparation instruction does or should include some form of instructional activity in each of these segments.

A variety of suggested strategies are presented in each segment. A composite of different techniques provides flexibility for the instructor. As indicated earlier, students learn from a large variety of different techniques, and one method or a lock-step sequence tends to be ineffective for many students. A composite of instructional strategies in each of the four sequences is designed as another aid for individualizing instruction.

Instructional Materials/Media: With the tremendous influx of instructional media and technology, totally individualized instruction is fast becoming economically and functionally feasible. This component, the fourth element of the task analysis, is designed to identify supplementary instructional materials and/or media. The identified materials and media are intended to be used in direct support of the previously-identified instructional strategies.

This section of the task module format provides a complete description of the identified instructional materials. Identification of title, media type, appropriate management mode, and procurement information are coded for each title. The key for this code is illustrated in Figure 9.

INSTRUCTIONAL MATERIALS/MEDIA CODE

Figure 9

MEDIA TYPE

Abbreviation	Media
Real objects	Real Demonstration/Simulation Devices
Mod - Mock	Models - Mock-ups
Games - Sim	Games - Simulators
S/S	Sound and Slide Programs
Flmstp/R-C	Filmstrip-Record/Cassette
Vid/Aud Rec	Video and/or Audio Recorder
Film, 16mm	Reel Film
Film, 8mm	Film Loop
Flmstp	Filmstrip
Transparency	Overhead Transparencies
Book Mat.	Related Book-Type Materials
Graph/Posters	Charts, Graphs, Posters (2D)

MANAGEMENT MODE

Abbreviation	Mode of Instruction
TEACH	Teacher
PARA-	Paraprofessional
SELF	Self
PEER	Peer
GROUP	Group Activity

PROCUREMENT INFORMATION

Abbreviation	Company Name/Address
MLA	Modern Learning Aids, Div. of Words Natural Science P.O. Box 302 Rochester, N.Y. 14603
RAYBAR	Raybar Technical Films, Inc. 210 North Boston Avenue Massapequa, N.Y. 11762
3 M	Minneapolis Mining & Manf. Co. Medical Film Library 2501 Hudson Road St. Paul, Minn. 55119

The management mode descriptor deserves some discussion to describe its purpose. This descriptor provides an indication of which instructional management mode (teacher-administered, self-administered, peer-administered, etc.) is most appropriate for a given instructional material. Its indirect purpose is to provide the teacher or instructional manager with an additional justification for efficiently individualizing instruction. Individualizing instruction by utilizing different management modes is an attempt to mate the learner's individual learning style, with the appropriate media; as well as incorporate instructional resources, other than the teacher, in the teaching-learning process.

THE ROLE OF ADVISORY GROUPS AND PERSONNEL

Advisory groups and personnel have played a key role in occupational education programs since their inception. They have contributed significantly to both the design, implementation, and evaluation of such programs.

As indicated by the model, advisory groups and personnel play a functional key role in all phases of the cluster-based curriculum as well. The advising capacity, however, is served by different types of groups and individuals.

Selected individuals who serve in curriculum advising capacities include labor market analysts, occupational program specialists, tradesmen/practitioners from industry, and industrial personnel representatives.

Carefully selected groups also provide a meaningful input in a curriculum advising capacity. Membership of this occupational curriculum advisory committee should be composed of:

1. Citizen representatives from the occupational industries or businesses involved.
2. Occupational teachers and counselors
3. Citizen representatives at large
4. Selected representatives from an employment commission, Department of Labor, or Chamber of Commerce.

The advisory component has the primary responsibility of insuring that the final curriculum fulfills the needs of the community, industry, and students totally. The ultimate success of any occupational preparation program is its ability to successfully place its graduates in the world of work. The degree to which this success is achieved is usually dependent upon the degree of involvement of advisory groups and personnel.

SUMMARY

In the introduction the five essential components for an occupational preparation program were discussed and analyzed. The purpose and intent of the CBOCDM is to systematically incorporate these components in a curriculum design.

To briefly review, the component of skill transferability is demonstrated by cluster commonality analysis phase of the Cluster-Based Occupational Curriculum Development Model. The career ladder sequencing of instructional tasks in the cluster commonality analysis provides a scheme for efficient program entry and exit. Pre-assessment of mastered skills is informally available through the task module format. An individual student pre-assessment may be conducted for each instructional task by administering a teacher-prepared pre-test covering the behavioral task skills and task knowledges. Performance-based objectives for instruction and evaluation provide the primary vehicle for curriculum content organization. Student instruction is individualized with the task module format of essential/related occupational competencies, multiple instructional strategies, and multimedia instructional materials.

To date little direction has emerged concerning career education curricula design at the secondary or occupational preparation level. The general components described what should be included in the design can be readily identified, but no one has yet synthesized and operationalized a model for arriving at an acceptable total design. The Cluster-Based Occupational Curriculum Development Model is one proposed scheme for systematically operationalizing the career education philosophy in curriculum design at the occupational preparation level.

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